1. ADVANCED MATERIALS

Module I (9 Hours)

Intelligent Materials: Primitive functions, intelligent inherent in materials, intelligent biological materials, biomimetics

Smart Materials and Structural Systems: Actuator materials, sensing technologies, microsensors, intelligent systems, hybrid smart materials, passive sensory smart structures, reactive actuator-based smart structures, smart skins, synthesis of future smart systems

Module II (8 Hours)

Electro-Rheological Fluids: Suspensions and the electro-rheological phenomenon, charge migration mechanism for the dispersed phase

Shape-Memory Materials: Background on shape-memory alloys and their applications, continuum applications (structures and machine systems), shape-memory-plastics

Module III (10 Hours)

Fibre-Optic Sensors: An overview of fibre-optics, light propagation in an optical fibre, embedding optical fibers in fiberous polymeric thermosets, fibre-optic strain sensors Micro and Nano-Phase Materials: Shortcomings of conventional materials, introduction to micro and nano-phase materials, synthesis via chemical routes, processing and characteristics, futuristic applications

Module IV (9 Hours)

Materials engineering for a better global environment, amorphous semiconductors, high performance fibers

Semiconducting Glasses: Oxide glasses, chalcogenide glasses; Insulating glasses: photochromic glasses, fluoride glasses

Text and Reference Books:

1. M.V.Gandhi and B.S. Thomson, Smart Materials and Structures, Chapman & Hall, London

2. Bishnu P. Pal, Fundamentals of Fibre Optics in Telecommunication and Sensor Systems, Wiley-Blackwell

3. A. Paul, Chemistry of Glasses, Chapman and Hall, London

4. Guozhong Cao and Ying Wang, Nanostructures and Nanomaterials: Synthesis, Properties, and Applications, 2nd Edition, World Scientific